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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,350	07/18/2003	Daniel Worledge	YOR920030046	4796

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EXAMINER

TRAN, LONG K

ART UNIT PAPER NUMBER

2818

DATE MAILED: 03/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/622,350	<b>Applicant(s)</b> WORLEDGE, DANIEL	
	<b>Examiner</b> Long K. Tran	<b>Art Unit</b> 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on July 18, 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1 - 21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 21 is/are rejected.
- 7) ☒ Claim(s) 1, 6, 12 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 July 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to because:

- a) The specification defines "first magnetic layer 202 and second magnetic layer 204. The first layer has a thickness  $t_1$  and the second layer has a thickness  $t_2$ ". The drawing fig. 2b shows second layer has thickness  $t_1$  and layer 1 has thickness  $t_2$ ; and
- b) The cross hatchings are not proper (see MPEP 608.02 [R-2] Drawing and under 37 CFR 1.84 (h) (3)).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

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2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “dusting layer” and “parallel in the zero field” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

3. Claims **1**, **6** and **13** are objected to because of the following informalities:

Claim 1, line 4: “to be parallel in zero field”? Are the first and second layers being parallel to each other or magnetic fields of the two layers being parallel? The examiner

interpret this limitation as " magnetization vectors  $M_1$  and  $M_2$  being substantially parallel in the zero field". Please clarify.

Claims 6 and 13: change "the hard axis" to -- a hard axis --.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims **1 – 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruigrok et al. (US Patent no. 5,600,297) in view of Ikeda (US Patent no. 6,661,703) or Hiramoto et al. (US Patent no. 6,767,655).

6. Regarding claim **1**, Ruigrok discloses a magneto-resistive device comprising:

A first magnetic layer 2 (fig. 1);

A second magnetic layer 1 (fig. 1); and

A nonmagnetic layer 3 (fig. 1) disposed between the first and second layers for coupling the first and second layers having magnetization vectors  $M_1$  and  $M_2$  being substantially parallel in the zero field (col. 4, lines 4 – 15).

Although, Ruigrok does not specify the device is a magnetic memory cell.

However, a magneto-resistive is well known in the semiconductor technology being use in memory devices as shown by Ikeda (fig. 4) or Hiramoto et al (fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to

integrate the magneto-resistive device in the magnetic memory cell as taught by Ikeda or Hiramoto, since it has been held to be within the general skill of a worker in the art to select a known device on the basis of its suitability for the intended use.

In addition, the recitation that "a magnetic memory cell" has not been given patentable weight because it has been held that a preamble is denied the effect of limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa V. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claims **2, 4, 5** and **3**, Ruigrok discloses the claimed invention of claim 1 except for the first layer: is thicker than the second layer (as cited in claim 2); is thicker than the second layer by a factor of two or more (as cited in claim 4); is thicker than the second layer by a factor of two or more and no greater than six (as cited in claim 5); and has substantially equal thickness as the second layer (as cited in claim 3).

However, it would have been well known in the art that the selection of those parameters such as **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, would have been obvious and involve routine optimization which has been held to be within the level of ordinary skill in the art. "Normally, it is to be expected that a change in **energy, concentration, temperature, time, molar fraction, depth, thickness, etc.**, or in combination of the parameters would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of

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the prior art ... such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmischer* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Moreover, the thickness of the first layer has not been alleged by applicant to be of significant importance for patentability.

Regarding claims **6** and **13**, Ruigrok and Ikeda disclose the first and second magnetic layers are strongly ferromagnetically coupled to one of another in parallel when they point in easy direction and weak enough so that the layers are coupled non-parallel when the layers point in the hard axis direction (Ruigrok: col. 4, lines 4 +; Ikeda: col. 2, lines 1 – 50).

Regarding claims **7** and **8**, Ruigrok, Ikeda and Hiramoto disclose the nonmagnetic comprise Cu or Ru, one of an element or alloy that provides an amount of exchange coupling that results in antiparallel switching logic (Ruigrok: col.3 lines 58+ and col. 5, lines 12 – 14; Ikeda: col. 4, lines 35 and 36; and Hiramoto: col.13, lines12 16)

Regarding claim **9**, Ikeda discloses the nonmagnetic spacer 112 (fig. 2) for providing a very large parallel coupling and a layer 114 (fig. 2; col. 4, lines 35 - 38) of material of granular shape for reducing the coupling (col. 5, lines 54+).

Regarding claim **10**, Ruigrok and Ikeda disclose the claimed invention of claims 1 and 9 except for the spacer material comprises a Ru layer.

However, Ru is well known in the semiconductor technology being use as a non-magnetic spacer as shown by Hiramoto (col. 13, lines 12 – 15) . It would have been obvious to one of ordinary skill in the art at the time of the invention was made to integrate the magneto-resistive device in the magnetic memory cell as taught by Ikeda, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use

Regarding claim **11**, Ikeda discloses the nonmagnetic spacer 112 (fig. 2) for providing a very large parallel coupling and a layer 114 (fig. 2; col. 4, lines 35 - 38) of material of granular shape for reducing the coupling between the first and second magnetic layers (col. 5, lines 54+).

Regarding claim **14**, Ruigrok discloses a magneto-resistive device for coupling a first magnetic layer to a second layer comprising:

A nonmagnetic layer 3 (fig. 1) disposed between the first and second layers for coupling the first and second layers having magnetization vectors M1 and M2 being substantially parallel in the zero field (col. 4, lines 4 – 15).

Although, Ruigrok does not specify the device is a magnetic memory cell. However, a magneto-resistive is well known in the semiconductor technology being use



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in memory devices as shown by Ikeda (fig. 4) or Hiramoto et al (fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention was made to integrate the magneto-resistive device in the magnetic memory cell as taught by Ikeda or Hiramoto, since it has been held to be within the general skill of a worker in the art to select a known device on the basis of its suitability for the intended use.

In addition, the recitation that "a magnetic memory cell" has not been given patentable weight because it has been held that a preamble is denied the effect of limitation where the claim following the preamble is a self-contained description of the structure not depending for completeness upon the introductory clause. *Kropa V. Robie*, 88 USPQ 478 (CCPA 1951).

Regarding claims **15 – 21**, Ruigrok does not teach the method of making device as claimed inventions of claims 15 – 21 (which are dependent on product claim 14). However this limitation is taken to be a product by process limitation, it is the patentability product and not of recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in

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a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

### ***Allowable Subject Matter***

7. Claim **12** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is an examiner's statement of reasons for the indication of allowable subject matter: Claim **12** is allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

Two magnetic layers separated only by a thin layer of nonmagnetic material comprising pinholes.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long Tran *UKT*

March 15, 2005

  
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